weight of the diffusing layer, in the range 0.01-2%, the barium sulphate having average particle sizes in the range 0.1-50 micron, the composite sides being at least ≥ 10 cm, said composite having one or more edge lit, the composite area being greater than 100 cm^2.

REMARKS

Claims 1-16 are pending in the above application. Claims 1-16 have been rejected. Claim 1 has been amended and no new claims have been added. Support for the amendment can be found throughout the application, for instance in the claims as originally filed. No new matter is added. Claims 1-16 are submitted for consideration at this time. Applicants respectfully request reconsideration and withdrawal of all rejections.

Claims 1-16 have been rejected under 35 U.S.C. 112, second paragraph, as indefinite for the recitation of "generally" in Claim 1. Claim 1 has been amended to remove the term "generally." Therefore, it is requested that the rejection be withdrawn.

Claims 1-7, 12 and 16 have been rejected under 35 U.S.C. §103(a) as obvious in light of U.S. Patent No. 5,422,523 (Kashima) and EP 0742181. Each reference will be addressed in turn below.

Regarding the Kashima reference, it is noted that the Examiner stated that "Kashima does not disclose the diffusing light layer thickness, or amount by weight or particle size of barium sulfate."

However, it is also noted that the Kashima reference contains the following statements. In lines 4-7 of Col. 3, Kashima states that "[t]o impart light diffusing ability to the light conducting plate, one may apply a light diffusing material ... to part of the plate surface. Examples of the light diffusing materials include paints and printing inks that contain titanium white, magnesium carbonate, barium sulfate, magnesium oxide

and other pigments that have higher refractive indices and diffusion reflectances than the material of which the light conducting plate is made." (Emphasis added.)

In lines 20-22 of Col. 3, it is stated that "[t]hose light diffusive material or silica or the like are screen printed or otherwise printed in dots or strips on the surface of the light conducting plate."

Additionally, it is observed that the example contained in line 63 of Col. 7 to line 31 of Col. 8 of the Kashina patent describes the light diffusing material containing inorganic particles as being applied over the surface of the light conducting plate as a paint containing titanium white. The material was screen printed over the light conducting plate as a pattern of circular dots (lines 7-10 of col. 8).

It is therefore submitted that the Kashima reference not only fails to teach the diffusing layer as admitted by the Examiner, but also that Kashima does not teach a thermoplastic composite panel comprising a light diffusing layer of thermoplastic material containing the claimed barium sulphate.

As illustrated in the above excerpts from the Kashima reference, Kashima only discloses paints and printing inks and not a panel. Kashima does not suggest or teach a thermoplastic panel containing barium sulfate in the amounts recited in the present Claim 1, much less that such a panel would possess the advantages illustrated in the examples contained in the present specification. It is submitted that this is especially true when the claimed sheet is compared to a similar thermoplastic sheet that contains titanium dioxide, rather than barium sulfate. (Compare example 2 (barium sulphate) with example 5 (titanium dioxide)). The disclosure of Kashima noted above would indicate to those of ordinary skill in the art that the two choices provided equivalent results. The examples of the invention show that this is far from accurate.

It is further submitted that one of ordinary skill would not rely upon the Kashima reference to use barium sulfate rather than titanium dioxide as a light diffusing material for the following two reasons. First, Kashima, as discussed above, is directed towards materials having higher refractive indices than the material of the light conducting plate (see Col. 3, lines 7-12). It is submitted that it is well known in the art that titanium dioxide has a reflective index of 3.1, which is significantly higher than the reflective index of barium sulfate (1.7). Thus, barium sulphate has better diffusion qualities. By recommending the use of titanium dioxide, it is submitted that the teachings of the Kashima reference are directed away from the claimed barium sulfate and the present invention.

Secondly, in the examples disclosed in the Kashima reference (lines 7-10 of Col. 8 and lines 8-11 and 52-54 of Col. 10), Kashima used titanium dioxide without exception. As noted above, the comparative examples in the present case show that titanium dioxide and barium sulphate produce far from equivalent results. Therefore, it is submitted that one of ordinary skill would not have been motivated to substitute titanium dioxide with barium sulfate based upon the teachings of the Kashima reference.

Additionally, it is submitted that a technical problem solved by the present invention is the discovery of sheets or panels for luminous signs or displays that are able to provide an intense and homogeneous lighting. Kashima discloses panels wherein the light diffusing material, as remarked above, comprises paints or printing inks containing titanium white, magnesium carbonate, barium sulfate, or magnesium oxide. However, Kashima does not disclose a thermoplastic layer/panel containing particles of barium sulphate or any of the features of Claim 1 that are directed to the percentage of the barium sulphate particles included in the diffusing layer.

Consequently, it is submitted that Kashima also does not disclose that when using a

thermoplastic layer/panel, the inclusion of barium sulfate is more advantageous than that of other inorganic compounds, such as titanium dioxide. Additionally, it is submitted that Kashima discloses panels which are made differently from that of the present invention.

It is also submitted that the Amendment dated March 5, 2002 further supports the above arguments. The comments made in the March 5, 2002 Amendment reflect the position that the composite of the invention, which comprises a thermoplastic diffusing layer containing barium sulfate in the diffusing layer as claimed in Claim 1 of the invention, is advantageous over that of the cited references because the claimed composite allows for a more homogeneous distribution of light. It is again submitted that this property is not disclosed or suggested by the teachings of the Kashima reference.

In light of these arguments and those presented above, it is submitted that the rejection is improper because the Kashima reference does not disclose critical aspects of the claimed invention. The EP '181 reference, discussed as follows, does not correct the deficiencies noted in Kashima.

Regarding the EP '181 reference, it is noted that the Examiner has argued that:

A. "EP '181 ... teaches a composite panel with a light reflective sheet in a back light unit under a transparent light guide plate with improved luminance (abstract) with a light diffusing sheet (page 4, line 17) having an average particle size of the inorganic filler of 0.1 to 7 μm and is in the range of 100 to 300 parts by weight, where the inorganic filler is barium sulfate (page 6, lines 20-31) and the amount of additive is 0.01 to 5 parts by weight (page 6, lines 50-51)" and that

B. "It would have been obvious to one of ordinary skill in the art to include the thickness of the light diffusing layer, the amount by weight and average particle size

of barium sulfate in the composite panel of Kashima because EP '181 teaches features are known within the art and one of ordinary skill would understand how to adjust the amounts and particle size of barium sulphate based on the amount of light desired to be diffused (emphasis added)."

It is submitted that, with reference to Fig. 1 (page 22 of EP '181) and to the legend on page 4, items 21 and 31 in said figure are the porous resin sheets; items 22 and 32 are the UV light protecting layers; 4 is the transparent light guide plate; 3, which consists of sheets 31 and 32, is the light reflecting layer under the transparent light guide plate 4; and 5 is the light diffusing sheet.

It is submitted that the light reflective sheet, besides possessing a porous resin sheet and a protective layer laminated on at least one surface of the porous resin sheet (lines 47-48 of page 3), also has a light reflectance at a wave length of 550 nm of 95% or more (line 24 on page 4).

The porous resin sheet of the light reflective sheet of the EP '181 reference also comprises a polyolefin resin and 100 to 300 parts by weight of a finely powdery inorganic filler with respect to 100 parts by weight of polyolefin (lines 49-50 on page 3). In the case of barium sulfate used in the EP '181 reference, however, the quantity is from 180 to 300 parts by weight with respect to 100 parts by weight of polyolefin (line 32 on page 6). Therefore, it is submitted that the percentage by weight of barium sulfate, as compared to the entire weight of the light reflective sheet, is from 180/ (180+100) to 300/ (300+100) , i.e. from 64.3% by weight to 75% by weight in EP '181.

In EP '181 it is also stated that when the quantity of the finely inorganic filler is small, a porous resin sheet having a high reflectance cannot be obtained (lines 22-26 on page 6). Also, according to the third embodiment of the invention made in the EP '181 reference, a

film having low light transmission, in which a total light transmittance is less than 20%, is used as protective layer in the light reflective sheet and this is laminated on the back surface of the porous resin (lines 28-29 of page 9). It is noted that said layer has a total light transmittance of less than 20% and is called a "light leakage preventing auxiliary layer" (line 31 of page 9). This layer is obtained by adding 5 to 70% by weight of an inorganic filler to the resin (lines 38-39 on page 9).

In lines 14-15 of page 11 of the EP '181 reference, it is also stated that, for the light diffusion sheet 5, a polyethylene terephtalate sheet or a polyethylene terephtalate film whose surface is embossed, can be used. However, it is submitted that the diffusive layer according to EP '181 does not contain any inorganic powder (e.g., barium sulphate) compound.

As for the "additive" mentioned in the Examiner's comments in (A) above, lines 36-37 of page 6 make it clear that this additive has nothing to do with barium sulfate. Therefore, the amounts indicated by the Examiner do not apply to the barium sulphate contained in the porous resin sheet.

Regarding the issue raised in the Office Action about the average particle size and the amount of inorganic filler in the composite panel of the EP '181 reference (see (A) on page 5 of this Amendment), it is submitted that it is not clear whether the Examiner is making reference to the light diffusing sheet or to the reflective sheet of the back light unit.

However, it is submitted that the light diffusing layer of the backlight device of EP '181 has nothing to do, as shown with the above discussion of the EP '181 reference, with the layer containing barium sulfate, which is the reflective layer. In fact, as illustrated above, both are two entirely different layers, and the properties of one cannot be transferred to the other. Also, as noted above, the diffusing layer according to the EP '181

reference does not contain any barium sulphate powder, unlike the diffusing layer of the present invention. Therefore, the teachings of the EP '181 reference do not address to the present invention, because in the backlight-device of the EP '181 reference the diffusing layer does not contain any finely powdery inorganic filler, such as barium sulphate.

It is also noted that even the third embodiment of the EP '181 reference, discussed on page 9 of the reference, and containing a quantity of barium sulfate from 5 to 70% by weight, does not direct one of ordinary skill to the present invention. This is because the light transmittance throughout this embodiment is very low, i.e. lower than 20%. This is opposed to the transmittance of the panel of the present invention which can be as high as 89% (see example 2, line 17 of page 12). Therefore, it is submitted that one of ordinary skill would not have been motivated to prepare the present invention based upon the teachings of the EP '181 reference.

It is also submitted that it is not apparent from the EP '181 reference how one of ordinary skill, in view of the technical problem of the present invention, would obtain the present invention. It is submitted that the EP '181 reference would have to be modified in order to obtain the present invention and that such a modification would require the following steps:

1) Discard the light diffusive sheet 5, not containing any finely powder inorganic filler (such as barium sulphate);

2) Modify the light reflecting layer, or in substitution the light leakage preventing auxiliary layer of the third embodiment, so that the light reflecting layers become light diffusing layers;

3) In particular, modify the films which (according to EP '181) give nearly

complete reflectance (i.e. > 95%) or a transmittance lower than 20%, to obtain the results provided by the present invention, i.e. an improved intense and homogeneous lighting of the panel.

It is submitted that one of ordinary skill would not consider making these significant and extreme changes to the invention of the EP '181 reference as the EP '181 reference fails to even suggest (much less teach) such changes. Furthermore, the Kashima reference (as discussed above) also fails to suggest the significant changes that would be required to modify the invention of the EP '181 reference into the present invention.

As noted above, EP '181 discloses a composite comprising a diffusive layer, which does not contain inorganic particles, and a reflective layer that contains the inorganic particles. EP '181 also discloses that the inorganic particles are contained both in the reflective layer (in order to provide a light reflectance higher than 95%), and in the light leakage preventing auxiliary layer.

EP '181, however, does not disclose a light diffusing sheet having a barium sulphate inorganic filler, as alleged by the Examiner. As Kashima does not remedy any of these discussed deficiencies, it is submitted that the combination of Kashima with EP '181 does not teach or suggest the claimed invention, nor does it allow one of ordinary skill to deduce the claimed invention from their combined teachings. Thus, it is requested that the rejection be withdrawn.

Claims 1-16 have been rejected under 35 U.S.C. 103(a) as obvious in light of the Ishii patent (U.S. Patent No. 5,710,856) and EP 0724181.

It is submitted that U.S. Patent No. 5,710,856 and EP 0724181 are, for the purposes of the present rejection, the same document, as they both stem from the same priority

document filed in Japan.

It is noted that the Examiner presented the following comment:

"Ishii discloses a thermoplastic resin film (column 11, line 58) and a film having excellent transparency (column 12, lines 30-31) with a light diffusion sheet mounted on a surface (column 6, line 31-32) ."

It is submitted that the light diffusion sheet mentioned at column 6, lines 31-32, is irrelevant to the present invention. It is noted that Ishii does not teach that the diffusing layer contains or can contain barium sulfate. Barium sulfate is contained in the porous sheet of the light reflective layer (column 7, line 23 - column 8, line 15), or also in the "light leakage preventing auxiliary layer" laminated on the back surface of the porous sheet(column 13, line 37 - column 14, line 3), but not the diffusing layer (unlike the present invention). Therefore, it is submitted that the arguments submitted with respect to EP '181 regarding this issue apply to Ishii as well.

It is also noted that Ishii discloses that a finely powdered inorganic filler is to be added in the range of 100 to 300 parts by wt. (column 8, lines 36-48) or 5 to 70% by weight of inorganic filler (column 13, lines 58-62). A light reflective sheet is also disclosed. It is submitted, though, that the Ishii light reflective sheet is the same article that contains barium sulfate. The reflective sheet comprises, as shown in the above discussion of the EP '181 reference, a porous resin sheet that contains from 100-300 parts by weight of the finely powdered inorganic filler. Therefore, it is submitted that the previous comments regarding this issue also apply to this rejection as well and are relied upon herein.

The Examiner indicated on page 5 of the Office Action that "Ishii discloses PET film containing an inorganic filler." It is submitted that the Examiner's quote describes examples 9-11 and comparative examples 2-4 (columns 21-22).

In example 9, a white PET film containing an inorganic filler (total light transmittance 9.8%) was laminated as a light leakage preventing auxiliary layer on the back surface of a porous resin sheet.

For the same purpose, example 10 used a white PET film having a total light transmittance of 9.8% and in example 11 the transmittance was 12.5%. At the end of Col. 21, it is reported that comparative example 1, wherein on a porous resin sheet containing 33% barium sulphate a PET film was laminated, had a total light transmittance of 90%. It is noted that comparative example 2 of Col. 22 is similar to comparative example 1. It is also noted that comparative example 3 of Col. 22 discloses a composite wherein on the reflective layer was not laminated the UV light protecting layer. Comparative example 4 of column 22 discloses a light reflective layer made with a white PET sheet, obtained by laminating to a PET film PET films containing calcium carbonate and then applying a titanium dioxide film.

From the above it is submitted that nothing relevant to the present invention can be drawn from columns 21-22 of Ishii.

The Examiner also stated that it would have been obvious to the skilled worker to include the thickness of the light diffusing layer of Ishii, because EP '181 and Ishii are analogous art and the thickness of the light diffusing layer is known to have a direct effect on the luminance.

It is noted again that the diffusing layer used by Ishii is completely different from that of the present invention, because the Ishii layer does not include any finely powdery inorganic filler.

Therefore, including the thickness of the diffusing layer of Ishii with the teachings of the EP '181 reference would not suggest the present invention for the reasons

already stated above.

On page 6 of the Office Action, the Examiner argues that Ishii discloses a thermoplastic film and a film having excellent transparency with a light diffusion sheet mounted on a surface.

The film having excellent transparency is laminated, according to the second embodiment of Ishii, on one or both surfaces of the porous resin sheet (lines 32-33 of column 12) and is a UV protective layer (lines 36 of column 12).

It is submitted that the UV protective layer has nothing to do, nor does it suggest the diffusive layer of claim 1 of the present invention.

As noted above with respect to EP '181, the light diffusion sheet used by Ishii is a polyethylene terephtalate sheet or a polyethylene terephtalate film whose surface is embossed, which is completely different from the present invention. Therefore, it is submitted that the Ishii reference does not teach the claimed invention. Additionally because the combination of cited references fail to teach or suggest all of the elements of the claimed invention, it is submitted that the rejection is improper and it is requested that the rejection be withdrawn.

It is also noted that at the bottom of page 6 of the Office Action, the Examiner stated that the Applicants argued that Ishii does not teach a layer applied on a surface of the transparent thermoplastic plate improving light diffusion. Applicants have reviewed their previous Response and were unable to locate any mention of such an argument. Therefore, it is submitted that the Examiner has misunderstood applicants' prior comments.

Additionally, on page 7 of the Office Action, the Examiner stated that although the Applicants argued that Ishii teaches a light reflecting layer, which is not claimed in

the present invention, Claim 12 discloses the use of a reflecting layer.

It is requested that the Examiner note that the reflecting film of claim 12 is not the same as the layer of the Ishii reference, since the former is positioned on one or more edges of the conducting layer wherein the source of light is not positioned (page 8, lines 21-24 of the spec.).

From Figure 1 of Ishii it is observed that the reflective layer is positioned in contact with the base surface of the conducting layer, thus it is not the same as the layer used in the present invention.

Therefore, it is submitted that the prior art combinations cited by the Examiner fail to disclose or suggest the solution found in the present invention to the technical problem of finding sheets or panels for luminous signs or displays, able to give an intense and as much as possible homogeneous lighting and it is requested that the rejections be withdrawn.

In view of the amendments and remarks above, Applicants submit that this application is in condition for allowance and requests reconsideration and favorable action thereon.

In the event this paper is not considered to be timely filed, Applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to our Deposit Account No. 01-2300. The Commissioner is hereby authorized to charge any fee deficiency or credit any overpayment associated with this communication to Deposit Account No. 01-2300, referencing Attorney Docket No. 108907-09021.

Respectfully submitted,

ARENT FOX KINTNER PLOTKIN & KAHN, PLLC

D. Daniel Dzara, II
Attorney for Applicants
Registration No. 47,543

Customer No. 004372
1050 Connecticut Avenue, N.W., Suite 400
Washington, D.C. 20036-5339
Tel: (202) 857-6000
Fax: (202) 638-4810

DDD:ksm

Enclosures: Marked Up Copy of Claim Amendments

MARKED UP COPY OF CLAIM AMENDMENTS

1. (Twice Amended) A thermoplastic composite panel, comprising a base transparent thermoplastic layer, conducting the light, having a thickness [generally] in the range 3-40 mm and a diffusing light layer, having a thickness in the range 10-1500 micron, placed on one or both surfaces of the base layer, said diffusing layer constituted by thermoplastic material containing barium sulphate in amount by weight, expressed as per cent ratio on the total weight of the diffusing layer, in the range 0.01-2%, the barium sulphate having average particle sizes in the range 0.1-50 micron, the composite sides being at least ≥ 10 cm, said composite having one or more edge lit, the composite area being greater than 100 cm^2.